

WHAT IS CLAIMED IS:

1. An apparatus for intact testing of an object, comprising, in combination:

5 means for scanning the intact object, said scanning means mounted on a robot, said robot free standing with respect to the object; and

comparison means to correlate data from the scanning means to a standard.

10 2. The apparatus of Claim 1, wherein said scanning means includes means to move in three linear directions and about at least two axes.

15 3. The apparatus of Claim 2, wherein said scanning means includes means to move in three linear directions and about three axes.

20 4. The apparatus of Claim 1, further including means to align said robot relative to the object.

25 5. The apparatus of Claim 1, wherein said robot includes a scanning head with means to move in three linear, orthogonally offset directions and at least two rotational directions.

30 6. The apparatus of Claim 5, wherein said robot includes a scanning head with means to move in three linear, orthogonally offset directions and three rotational directions.

7. The apparatus of Claim 1, further including collision-avoidance means on said scanning means to prevent gross contact with the object.

5 8. The apparatus of Claim 1, wherein said scanning means includes ultrasonics.

9. An apparatus for intact testing of an object, comprising, in combination:

means for scanning the intact object mounted on a robot; and

5 comparison means to correlate data from the scanning means to a standard;

a structure configured to contain said apparatus and said object under inspection;

10 said apparatus is coupled to said structure, resulting in the formation of a gantry for supporting a carriage, a mast mounted on said carriage and at least one of an emitter and detector mounted on said mast which forms in part at least one inspection robot capable of precise positioning over large ranges of motion;

15 said at least one inspection robot further comprises a beam structure for supporting and allowing horizontal translation of said carriage;

20 said carriage is coupled to said mast, wherein said mast supports and allows a vertical translation of said at least one of the emitter and detector mounted on said mast, and wherein said mast is configured to provide yaw movement of said at least one of the emitter and detector; and

25 said at least one of the emitter and detector is configured to provide rotation about at least one axis of roll and yaw motion of said at least one emitter and detector.

30 10. The apparatus of Claim 9, wherein said scanning means includes ultrasonics.

11. The system of Claim 9, wherein at least one of the emitter and detector is configured to provide rotation about an axis of pitch motion of said at least one emitter and detector.

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12. The system of Claim 9, wherein said at least one of the emitter and detector is configured to a yoke to provide rotation about at least one axis of pitch and roll motion of said at least one of the emitter and detector.

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13. An apparatus for intact testing of an object, comprising, in combination:

means for scanning the intact object mounted on a robot;

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comparison means to correlate data from the scanning means to a standard;

a structure dimensioned to receive the object therewithin;

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said robotic scanning means supported by said structure and including means to move a scanning head of said robotic scanning means in three linear directions and at least two rotational directions;

means to initialize said scanning head both with respect to said robot and with respect to the object; and

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means to correlate data derived from scanning the object to a standard.

14. The apparatus of claim 13, wherein said robotic scanning means including means to move the scanning head of said robotic scanning means in three linear directions and three rotational directions.

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15. The apparatus of claim 13, further comprising means to hold the object in a constant position.

5 16. The apparatus of claim 15, further comprising means to assess gross distortion of object geometry.

17. The apparatus of claim 16, further comprising said scanning head generating a laser scan.

10 18. The apparatus of claim 16, further comprising said scanning head generating an electromagnetic scan.

19. The apparatus of claim 16, further comprising said scanning head generating a radar scan.

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20. A method for testing an object for present or potential defects, comprising:

scanning the object with a sensor means to generate data for the object;

20 comparing the data for the object for correlation with reference data;

identifying any defects as a result of the comparison.

25 21. The method of Claim 20, wherein the sensing means includes a robot for sensing, monitoring at least one sensor on the robot, and moving the at least one sensor in X, Y, or Z directions and/or about at least two axes.

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22. The method of Claim 21, wherein the robot is moved about any of a pitch, roll, and yaw axis.

23. The method of Claim 20, wherein the sensing means employs ultrasonics.

24. The method of Claim 20, further comprising:  
5 initializing the sensing means relative to a fixed spot in order to precisely locate the object.

25. The method of 24, further comprising:  
10 updating the comparison with other data associated with the object to provide trend analysis.